UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/660,446	09/11/2003	David L. Barron	SC12893TS	4897

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EXAMINER
SWERDLOW, DANIEL

ART UNIT	PAPER NUMBER
2646	

DATE MAILED: 08/31/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
Office Action Summary	10/660,446	BARRON ET AL.
	Examiner	Art Unit	
	Daniel Swerdlow	2646	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _11 September 2003_.

2a)☐ This action is **FINAL.**   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-39_ is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-5, 7 and 9-39_ is/are rejected.

7)☒ Claim(s) _6 and 8_ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _11 September 2003_ is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1.   **Claim 2 is objected to because of the following informalities:** The number of

the independent claim from which Claim 2 depends is omitted from the first line of the

Claim. Examiner assumes the claim depends from Claim 1. Appropriate correction is

required.

2.   **Claim 29 is objected to because of the following informalities:** Due to an

apparent typographical error, Claim 29 begins "The method of claim 19 wherein...".

Claim 19 is drawn to an echo cancellation system, not a method. Examiner assumes the

claim is intended to begin --The echo cancellation system of claim 19 wherein--.

Appropriate correction is required.

3.   **Claim 35 is objected to because of the following informalities:** Due to an

apparent typographical error, Claim 29 begins "The echo cancellation system of claim 1

wherein...". Claim 1 is drawn to a method, not an echo cancellation system. Claim 19 is

drawn to an echo cancellation system. Examiner assumes the claim is intended to begin -

-The echo cancellation system of claim 19 wherein--. Appropriate correction is required.

Claim Rejections - 35 USC § 112

4.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly
> claiming the subject matter which the applicant regards as his invention.

5.   **Claims 34 and 36 are rejected under 35 U.S.C. 112, second paragraph, as**

being indefinite for failing to particularly point out and distinctly claim the subject

matter which applicant regards as the invention.

6.   Claim 34 recites the limitation "the echo canceller system". There is insufficient antecedent basis for this limitation in the claim. In order to advance prosecution to greatest possible degree, examiner makes prior art rejections below based on the interpretation that the recitation is intended as --the echo cancellation system--.

7.   Claim 36 recites the limitation "the integrated circuit" in the second line. There is insufficient antecedent basis for this limitation in the claim. In order to advance prosecution to greatest possible degree, examiner makes prior art rejections below based on the interpretation that the recitation is intended as --an integrated circuit--.

Claim Rejections - 35 USC § 102

8.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9.   **Claims 1 through 5, 7, 9, 12, 13, 16 through 25, 29 through 33 and 35-39) are rejected under 35 U.S.C. 102(b) as being anticipated by Janse (US Patent 5,390,250).**

10.   Regarding Claim 1, Janse discloses an echo cancellation system (Fig. 1) comprising: a frequency domain adaptive filter (Fig. 1, reference 8) that filters a far end signal $(x(k)$ to produce an estimate of an echo in a near-end signal $(z(k))$; a summing junction that subtracts the estimate from the near end signal $(z(k))$ to produce an error signal $(r_a(k))$; an attenuator (11) that attenuates an error signal $(r(k))$ that corresponds to the first signal claimed and includes a component of the near end signal $(z(k))$ (i.e., $r(k)=z(k)-y(k))$. Janse further discloses calculating ERLE (i.e., echo return loss

enhancement) on the basis of mean signal power Pr (i.e., using the error signal) and using the ERLE to calculate the attenuator transfer factor (column 7, lines 50-68).

11.   Regarding Claim 2, Janse further discloses a time domain programmable echo canceller (Fig. 1, reference 9) that produces a second echo estimate (y(k)) and an associated cancellation junction (Fig. 1, reference 7) that subtracts the estimate from the near end signal (z(k)) and provides the error signal (r(k)) that corresponds to the first signal claimed.

12.   Regarding Claim 3, Janse further discloses the error signal (r(k)) that corresponds to the first signal claimed formed by subtracting the echo estimate (y(k)) from the near end signal (z(k)).

13.   Regarding Claim 4, Janse further discloses the filtering being adaptive filtering (column 7, lines 6-8).

14.   Regarding Claim 5, Janse further discloses calculating a value of ERLE (ERLE_P) that ERLE gets set back to if the ERLE exceeds it (i.e., an ERLE ceiling value) (Fig. 5, step 71, 73). Janse further discloses ERLE_P being calculated from a previous maximum value (Fig. 5, step 60).

15.   Regarding Claim 7, Janse further discloses calculating attenuation (Fig. 3, step 49) by calculating ERLE (Fig. 3, step 48) including calculating background noise (i.e., noise floor) (Fig. 3, step 38).

16.   Regarding Claim 9, Janse further discloses calculating attenuation (Fig. 3, step 50) by calculating ERLE (Fig. 3, step 48) including calculating background noise (i.e., an environmental attenuation factor) (Fig. 3, step 38).

17.   Regarding Claim 12, Janse further discloses the near end signal (z(k))

representing sounds received from a microphone (Fig. 1, reference 5).

18.   Regarding Claim 13, Janse further discloses the transfer factor of the variable

attenuation being inversely proportional to the square root of the ERLE (Fig. 3, reference

50). Because a transfer factor of unity represents no attenuation and a transfer factor of 0

represents complete attenuation, this shows greater ERLE resulting in greater attenuation.

19.   Regarding Claim 16, Janse further discloses all functions being performed by a

digital signal processor (column 6, lines 5-61).

20.   Regarding Claim 17, Janse further discloses all functions being performed by a

DSP 56001 digital signal processor (column 6, lines 5-61) that operates by executing

code stored in a random access memory (i.e., computer readable medium).

21.   Regarding Claim 18, as shown above apropos of Claim 13, Janse further discloses

greater ERLE resulting in greater attenuation. Because ERLE is inherently low during

doubletalk owing to the near end signal not being reduced by the cancellation junction,

the inherently results in relatively low attenuation during doubletalk as compared with

only a far end talker.

22.   Regarding Claim 19, Janse discloses an echo cancellation system (Fig. 1)

comprising: a frequency domain adaptive filter (Fig. 1, reference 8) that filters a far end

signal (x(k) to produce an estimate of an echo in a near-end signal (z(k)); a summing

junction that subtracts the estimate from the near end signal (z(k)) to produce an error

signal ($r_a(k)$); an attenuator (11) that attenuates an error signal (r(k)) that corresponds to

the first signal claimed and includes a component of the near end signal (z(k)) (i.e.,

r(k)=z(k)-y(k)). Janse further discloses calculating ERLE (i.e., echo return loss

enhancement) on the basis of mean signal power Pr (i.e., using the error signal) and using the ERLE to calculate the attenuator transfer factor (column 7, lines 50-68).

23.   Regarding Claim 20, Janse further discloses a time domain programmable echo canceller and cancellation junction configuration (Fig. 1, reference 9, 7) that corresponds to the second echo canceller claimed and provides the error signal (r(k)) that corresponds to the first signal claimed from the near-end signal (z(k)) and the far end signal (x(k)).

24.   Regarding Claim 21, Janse further discloses the filtering being adaptive filtering (column 7, lines 6-8).

25.   Regarding Claim 22, Janse further discloses the echo canceller operating based on an echo path impulse response (column 7, lines 6-16) which is inherently linear.

26.   Regarding Claim 23, Janse further discloses calculating a value of ERLE (ERLE_P) that ERLE gets set back to if the ERLE exceeds it (i.e., an ERLE ceiling value) (Fig. 5, step 71, 73). Janse further discloses ERLE_P being calculated from a previous maximum value (Fig. 5, step 60).

27.   Regarding Claim 24, Janse further discloses calculating attenuation (Fig. 3, step 49) by calculating ERLE (Fig. 3, step 48) including calculating background noise (i.e., noise floor) (Fig. 3, step 38).

28.   Regarding Claim 25, Janse further discloses calculating attenuation (Fig. 3, step 50) by calculating ERLE (Fig. 3, step 48) including calculating background noise (i.e., an environmental attenuation factor) (Fig. 3, step 38).

29.   Regarding Claim 29, Janse further discloses the transfer factor of the variable attenuation being inversely proportional to the square root of the ERLE (Fig. 3, reference

50). Because a transfer factor of unity represents no attenuation and a transfer factor of 0

represents complete attenuation, this shows greater ERLE resulting in greater attenuation.

30.   Regarding Claim 30, Janse further discloses use in a loudspeaking telephone set

(i.e., a communication device) (column 5, lines 50-51).

31.   Regarding Claim 31, Janse further discloses use in a loudspeaking telephone set

(i.e., a two way communication path providing voice information) (column 5, lines 50-

51).

32.   Regarding Claim 32, Janse further discloses use in a loudspeaking telephone set

(column 5, lines 50-51). Because a loudspeaking telephone set can be used to

communicate via a public telephone network with a cellular phone, thereby being utilized

in a communication path including a wireless communication path with a cellular phone,

the additional limitation does not affect the structure of the communication device

claimed. As such, the additional limitation is an intended use and carries no patentable

weight.

33.   Regarding Claim 33, Janse further discloses use in a loudspeaking telephone set

(i.e., providing hands free communication to a near end user) (column 5, lines 50-51).

34.   Regarding Claim 35, Janse further discloses all functions being performed by a

DSP 56001 digital signal processor (column 6, lines 5-61) that operates by executing

code stored in a random access memory.

35.   Regarding Claim 36, Janse further discloses all functions being performed by a

DSP 56001 digital signal processor (column 6, lines 5-61) that is an integrated circuit and

operates by executing code stored in a random access memory on the integrated circuit.

36.   Regarding Claim 37, Janse further discloses use in a loudspeaking telephone set

(i.e., is an acoustic echo canceller) (column 5, lines 50-51).

37.   Regarding Claim 38, Janse further discloses use in full duplex communications in

a loudspeaking telephone set (column 1, lines 27-33).

38.   Claim 39 is essentially similar to Claim 1 and is rejected on the same grounds.

Claim Rejections - 35 USC § 103

39.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

40.   **Claims 10, 11, 26 and 27 are rejected under 35 U.S.C. 103(a) as being**

unpatentable over Janse in view of Genter (US Patent 5,283,784).

41.   Regarding Claims 10 and 26, as shown above apropos of Claims 1 and 19,

respectively, Janse anticipates all elements except adding comfort noise based upon the

attenuation factor. Genter discloses an echo canceller (Figs. 1, 2) in which comfort noise

is added (Figs. 1 and 2, reference 84) to attenuated echo canceller error signal (ERR) that

corresponds to the first signal claimed (column 7, lines 9-29). Genter further discloses

scaling the added noise in accordance with attenuation of the error signal (ERR) that

corresponds to the first signal claimed (column 8, lines 8-20). Genter further discloses

that such an arrangement provides residual echo suppression without noticeable

variations in noise (column 3, lines 1-21). It would have been obvious to one skilled in

the art at the time of the invention to apply comfort noise mixing as taught by Genter to

the echo canceller taught by Janse for the purpose of realizing the aforesaid advantages.

42.   Regarding Claims 11 and 27, Genter further discloses the comfort nose signal

being and the error signal (ERR) that corresponds to the first signal claimed being

inversely varied along their respective ranges (column 8, lines 37-44).

43.   **Claims 14, 15 and 28 are rejected under 35 U.S.C. 103(a) as being**

unpatentable over Janse in view of Horna (US Patent 4,064,379).

44.   Regarding Claim 14, as shown above apropos of Claim 1, Janse anticipates all

elements of that claim. Horna discloses implementation of an echo canceller, including

residual echo suppression in the logarithmic domain (abstract). Horna further discloses

that such an arrangement simplifies hardware and reduces complexity, size and cost

(column 2, lines 21-24). It would have been obvious to one skilled in the art at the time

of the invention to apply logarithmic domain calculation as taught by Horna to the echo

canceller taught by Janse for the purpose of realizing the aforesaid advantages. The

formula for attenuation factor claimed, $10^{\wedge}(ERLE *c)$ where c is one of a constant or a

variable does not limit the claim since c, as a variable, can take on any value and, as such,

the entire expression can take on any value. As such, any expression for an attenuation

factor meets the claim.

45.   Regarding Claim 15, Janse further discloses the attenuation factor (Amic) ranging

between 0 and 1 (column 8, lines 4-7).

46.   Regarding Claim 28, as shown above apropos of Claim 19, Janse anticipates all

elements of that claim. Horna discloses implementation of an echo canceller, including

residual echo suppression in the logarithmic domain (abstract). Horna further discloses

that such an arrangement simplifies hardware and reduces complexity, size and cost

(column 2, lines 21-24). It would have been obvious to one skilled in the art at the time

of the invention to apply logarithmic domain calculation as taught by Horna to the echo

canceller taught by Janse for the purpose of realizing the aforesaid advantages. The

formula for attenuation factor claimed, $10^{\wedge}(ERLE *c)$ where c is one of a constant or a

variable does not limit the claim since c, as a variable, can take on any value and, as such,

the entire expression can take on any value. As such, any expression for an attenuation

factor meets the claim.

47.   **Claim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable over Janse
in view of well known prior art.**

48.   Regarding Claim 34, as shown above apropos of Claim 30, Janse anticipates all

elements except the echo canceller being implemented in an automobile sound system.

Examiner takes Official Notice of the fact that the use of loudspeaking telephones in

automobiles is well known and that the advantages of such devices, namely enhanced

safety and convenience, are also well known. As such, it would have been obvious to

one skilled in the art at the time of the invention to implement the loudspeaking telephone

taught by Janse, including echo cancellation system in an automobile sound system for

the purpose of realizing the aforesaid advantages.

Allowable Subject Matter

49.   **Claims 6 and 8 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.**

50.   The following is a statement of reasons for the indication of allowable subject matter:

51.   Regarding Claim 6, as shown above apropos of Claim 5, Janse anticipates all elements of that claim. US Patent 4,064,379 to Horna discloses implementation of an echo canceller, including residual echo suppression in the logarithmic domain (abstract). However, the prior art does not disclose or suggest calculating an attenuation factor by dividing ERLE by an ERLE ceiling value as claimed. As such, the claim is allowable matter.

52.   Regarding Claim 8, as shown above apropos of Claim 7, Janse anticipates all elements of that claim. US Patent 4,064,379 to Horna discloses implementation of an echo canceller, including residual echo suppression in the logarithmic domain (abstract). However, the prior art does not disclose or suggest calculating an attenuation factor by multiplying ERLE by a noise floor value as claimed. As such, the claim is allowable matter.

Conclusion

53.   The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The data sheet for the Motorola DSP 56001 is cited in support of statements made apropos of the Janse reference.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel Swerdlow whose telephone number is 571-272-7531. The examiner can normally be reached on Monday through Friday between 7:30 AM and 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sinh H. Tran can be reached on 571-272-7564. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Daniel Swerdlow
Examiner
Art Unit 2646

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26 August 2005